Assessing undergraduates' understanding of genetics and race.

UNIVERSITY OF MINNESOTA

Schneider JR, Magstadt JM, Blaskowski AR, Pokorny AK, Olson AN, Furniss KL, Prescott KK, Lane AK
Department of Biology Teaching and Learning

Why combat racial essentialism in biology courses?

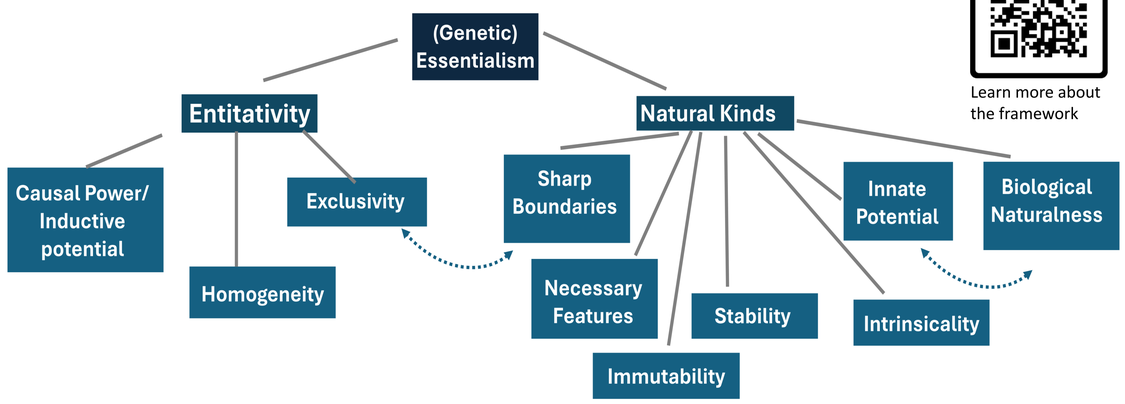
Students who incorrectly believe that racial groups are based in biology:

- struggle to grasp genetics concepts[1]
- are less inclined to interact with others they perceive as different[2]
- are unmotivated to address inequality[3]
- tend to support racial stereotypes[4]

Revised curriculum combats essentialist ideas and promotes understanding of genetics concepts.[5]

Goal: Develop an instrument to measure student racial essentialist beliefs

Theoretical Framework



Learn more about the framework

Methods Overview

Semi-Structured interviews with undergraduates

- Explain how they conceptualize race
- Connect their understanding of race with biology

Item development

Validation Criteria[6]	Validation Process	Status
Content Validity. Does each item represent the intended construct?	Build survey items based on known beliefs. Check using expert feedback.	In progress
Response Process Validity. Are participants thinking about this in the way you expect?	Students describe their thought process while responding to survey items.	In progress
Internal Structure Validity. Do questions asking similar things yield consistent results?	Pilot survey in many classrooms, factor analysis to check this.	'24-'25
Relations to other variables. Is the construct related to something outside the survey?	Connect responses to survey items with other variables outside of our instrument.	'24-'25
Generalization validity. How well does the instrument apply across contexts?	Pilot survey in a variety of undergraduate contexts.	'24-'25

Results. Themes from student interviews

Inconsistent ideas about race

Students define race as a social construct, but also use genetics to explain the existence of more African Americans in certain sports.

Difficulty connecting to genetics

Students are confused about how genes relate to traits and how variation relates to populations, races, and/or geography.

Conclusions

- Many undergraduates hold both essentialist and non-essentialist ideas about race, depending on context.
- Classroom interventions should target specific student beliefs and go beyond general information to specific examples or cases.

Status and next steps

- We continue to refine our framework and to develop items to test student beliefs
- Next year, we will pilot our survey instrument in more classrooms and institutions.
- Ultimately, we hope to use this instrument to improve classroom-based interventions.

Get involved!
Scan to share your interest in piloting the instrument

Researcher Positionality

The majority of our research team is white, which limits our range of perspectives and affects our interactions. Impacts on this research include:

- The use of essentialism as a guiding framework[7,8], rather than, for example, anti-Blackness[9]
- Differences in the comfort level of white interview participants compared to participants of color[10]

References Cited

1. Lynch, K., Morandini, J., Dar-Nimrod, I., & Griffiths, P. (2019). Causal Reasoning About Human Behavior Genetics: Synthesis and Future Directions. *Behavior Genetics, 49*(2), 221-234.
2. Keller, J. (2005). In Genes We Trust: The Biological Component of Psychological Essentialism and Its Relationship to Mechanisms of Motivated Social Cognition. *Journal of Personality and Social Psychology, 88*(4), 686-702.
3. Donovan, B. (2017). Learned inequality: Racial labels in the biology curriculum can affect the development of racial prejudice. *Journal of Research in Science Teaching, 54*(3), 379-411.
4. Bastian, B., & Haslam, N. (2006). Psychological essentialism and stereotype endorsement. *Journal of experimental social psychology*, *42*(2), 228-235.
5. Donovan, B., Weindling, M., Salazar, B., Duncan, A., Stuhlsatz, M., & Keck, P. (2021). Genomics literacy matters: Supporting the development of genomics literacy through genetics education could reduce the prevalence of genetic essentialism. *Journal of Research in Science Teaching, 58*(4), 520-550.
6. American Educational Research Association, American Psychological Association, & National Council on Measurement in Education. (2014). *Standards for educational and psychological testing*. Washington, DC: American Educational Research Association.
7. Tawa, J. (2017). The Beliefs About Race Scale (BARS): Dimensions of Racial Essentialism and Their Psychometric Properties. Cultural Diversity & Ethnic Minority Psychology, 23(4), 516-526.
8. Heine, S., Cheung, B., & Schmalor, A. (2019). Making Sense of Genetics: The Problem of Essentialism. *The Hastings Center Report, 49*(S1), S19-S26.
9. Dancy, T. E., Edwards, K. T., & Earl Davis, J. (2018). Historically white universities and plantation politics: Anti-Blackness and higher education in the Black Lives Matter era. *Urban Education*, *53*(2), 176-195.
10. Morning, A., Brückner, H., & Nelson, A. (2019). Socially Desirable Reporting And The Expression of Biological Concepts of Race. *Du Bois Review, 16*(2), 439-455.